

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

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PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing
(day/month/year) **22 NOVEMBER 2004 (22.11.2004)**

Applicant's or agent's file reference
YL04002PCT

FOR FURTHER ACTION

See paragraph 2 below

International application No.

PCT/KR2004/000454

International filing date (day/month/year)

03 MARCH 2004 (03.03.2004)

Priority date(day/month/year)

17 FEBRUARY 2004 (17.02.2004)

International Patent Classification (IPC) or both national classification and IPC

IPC7 H01M 10/40

Applicant

GYEONGSANG NATIONAL UNIVERSITY et al

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/KR



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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/KR2004/000454

Box No. 1 Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This opinion has been established on the basis of a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).

2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

- ☐ a sequence listing
☐ table(s) related to the sequence listing

b. format of material

- ☐ in written format
☐ in computer readable form

c. time of filing/furnishing

- ☐ contained in the international application as filed.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/KR2004/000454

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | | |
|-------------------------------|--------|-----|-----|
| Novelty (N) | Claims | 1-5 | YES |
| | Claims | | NO |
| Inventive step (IS) | Claims | 1-5 | YES |
| | Claims | | NO |
| Industrial applicability (IA) | Claims | 1-5 | YES |
| | Claims | | NO |

2. Citations and explanations :

The invention of claims 1-5 is that the sodium-sulfur battery includes a solid sodium anode, the liquid electrolyte and the solid sulfur cathode.

D1 : US 4070527(24 Jan. 1978)

D2 : US 6329099(11 Dec. 2001)

D3 : JP12-58108(25 Feb. 2000)

1. D1 discloses a sodium-sulfur batteries that are provided by enhancing the utilization of active positive-electrode material with employing a liquid sodium electrode separated from a liquid sulfur electrode by a solid beta-alumina electrolyte separator.

2. D2 disclose a sodium-sulfur battery that includes a cell container for the positive electrode which is hardly deteriorated by corrosion. The cell container for the positive electrode is assembled by integrating plural members made of a high corrosion resistant alloy.

3. D3 disclose a sodium-sulfur battery that arranges an object having affinity to liquid sodium at the upper section of a negative electrode chamber, and providing a sodium limiting tube having a structure.

The documents of D1, D2 and D3 do not disclose the NaS battery using liquid electrolyte.

None of the documents above, taken alone or in combination, reveals the invention defined in the claims 1-5. Therefore, the invention is novel, involves an inventive step and has industrial applicability